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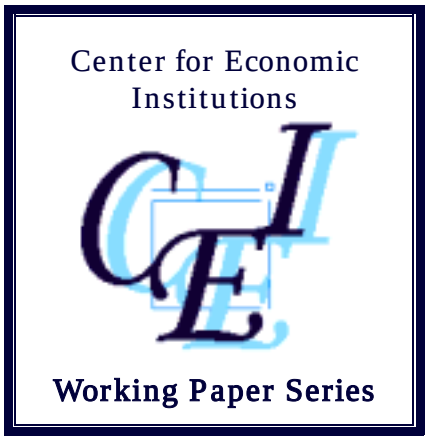

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Do Main Banks Extract Rents from their Client Firms? Evidence from Korean *Chaebol*[*]

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Abstract

Using a unique data set on all industrial firms listed on Korea Stock Exchange and KOSDAQ stock market from 1991 to 2000, we find that cash ratios for *chaebol* firms are lower than for non-*chaebol* firms. Controlling for access to the bond market and financial services arms does not change this result. We do however find that there is a shift in the degree of bank power over the last decade. Consistent with the main bank monopoly hypothesis during the corporate restructuring process after the financial crisis in 1997, the interest differential charged to *chaebol* firms is significantly higher than the earlier period, suggesting extraction of rents against *chaebol* client firms by main banks.

Key words: Cash holdings, bank power, rent extraction, Korean *chaebol*
JEL classifications: G15, G18, G32

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1. Introduction

The contemporary banking literature has analyzed the benefits and costs of the close relationship between banks and their client firms. When banks and their borrowers have close ties, main banks' delegated monitoring of client firms can avoid duplication and the potential free-rider problems (Diamond, 1984), and the long-term bank-firm relationship mitigates problems of asymmetric information between two agents, which results in optimal renegotiated debt contracts with lowered financing costs and reduced credit rationing ((Hellwig (1989), Sharpe (1990), Boot and Thakor (1994), and Peterson and Rajan (1995)). The analysis by Rajan (1992), in contrast, predicts that private information provides banks with the power and the opportunity to extract rents from their client firms, which may lead to moral-hazardous behavior by the borrowers.[1]

Empirical evidence on rent-seeking behavior by main banks under bank-centered financial systems is mixed. Elsas and Krahnen (1998) using data on German main bank (i.e., *housebank*) behavior, find that credit margins are not affected by the lending relationship and that there is no significant difference in loan pricing between housebanks and normal banks. Weinstein and Yafeh (1998), on the other hand, report that the average cost of borrowing is higher for Japanese business group (*keiretsu*) affiliated firms than independent firms, although close bank-firm ties increase the availability of capital to keiretsu-affiliated firms. Pinkowitz and Williamson (2001) also find the value of main bank as a corporate governance mechanism to be doubtful, since they report that during periods in Japan when the main bank has greater monopoly power firms hold larger cash balances, which have substantial opportunity costs.

In an examination of 1991 balance sheet data for G-7 countries, Rajan and Zingales (1995) find that cash ratios range from 8.2 percent to 18.4 percent.[2] They report that in general, firms in countries

[1] See Boot (2000) for a recent review of the literature on "relationship banking."

[2] Cash ratios are determined as cash plus short-term investments divided by the book value of total assets, which are then averaged across all non-financial firms in each country. The cash ratio for Canada is 8.2% and that for Japan is 18.4 percent in the study by Rajan and Zingales (1995). A recent study by Pinkowitz and Williamson (2001) shows

where there exists greater access to external financing, especially capital markets, tend to hold less cash. These firms are generally large, and have good credit ratings. On the other hand, firms in countries where lending institutions have the monopoly power, have much higher levels of cash holdings, indicating that cash holdings may be used as an effective indicator of rent extraction.

In this paper, we investigate the effect of main bank relationship on the cash and deposits holdings and cost of borrowing using data from Korean business group (*chaebol*) affiliated firms (here-in-after *chaebol* firms) and non-*chaebol* firms. In Korea the 30 largest *chaebol* historically have been required to operate with a main bank. A list of the 30 largest *chaebol* and their designated main banks is provided in Appendix 1.[3] The government initiated a main bank system in order to monitor and control credit allocation to the largest business groups in support of government policy of fostering rapid economic development through export-led growth. Non-*chaebol* firms (which in this paper we will take to mean firms outside the 30 largest *chaebol*) were generally not required to have main banks. The main bank system in Korea constituted a long-term relationship between *chaebol* firms and main banks. The major issue to be addressed in this paper is whether main banks were able to exploit their monopoly power with *chaebol* firms. In order to examine this issue, we first look at whether Korean *chaebol* firms have higher cash holdings than non-*chaebol* firms. If main banks were extracting rents from non-bank firms, firms with main banks would have larger amount of short-term deposits and marketable securities in the banks than firms without main banks. Therefore, if status of main bank carries monopoly power, *chaebol* firms would have higher cash holdings than non-*chaebol* firms when other things are constant.

Using all Korean industrial firms listed between 1991 and 2000, we find that the cash ratio of firms in *chaebol* is about 2 to 4 percent lower than that of non-*chaebol* firms. It appears that unlike Japanese main bank system where main banks historically have power over their related firms, Korean

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similar results of cash ratios for Germany, Japan, and the U.S.

[3] Nam and Kim (1994) review the Korean main bank system. The main functions of main banks include examining clients' plans for improving their capital structure and management, setting ceilings on credit allocations, and overseeing extensions of new credit. A non-main bank must consult its *chaebol* client firm's main bank when extending new credit to the firm. The main bank in Korea is broadly viewed as a legal term for regulators to control credit allocation among *chaebol.*

main banks are too weak to extract rents from their client firms, although both Japanese and Korean main banks have had a long-term relationship with their client firms. Surprisingly, our 10 year (from 1991 to 2000) average cash ratio of 5.1 % for *chaebol* firms is less than one-third of the average cash ratio for Japanese firms reported in Rajan and Zingales (1995) and Pinkowitz and Williamson (2001). In their samples, about half of the firms are Japanese business group or keiretsu firms. For an overview of the Japanese main bank system, see Aoki, Patrick, and Sheard (1994). The restrictions on firm equity ownership by banks may have led banks to exercise only limited power in Korea. We find evidence that firms not affiliated with a *chaebol* hold significantly higher levels of cash relative to assets and to bank loans. This finding is consistent with the notion that banks are extracting rents against small less known firms rather than against prestigious clients regardless of the length of the banking relationship.

We find that *chaebol* and non-*chaebol* firms with access to the bond market maintain lower cash holdings than do firms without such access. Access to the bond market would seem to reduce cash holdings by about half the reduction brought by *chaebol* status. *Chaebol* firms continue to have significantly lower cash balances than non-*chaebol* firms even after controlling for access to the bond market. Controlling for access to the bond market does not reduce the magnitude of the effect on cash holdings of *chaebol* status. These results are robust across pre-crisis (1991-1996) and post-crisis (1997-2000) periods. The division of *chaebol* firms into those with and without financial arms as part of the group found that. The presence of a financial arm within a chaebol was not found to reduce cash holdings of firms in that *chaebol* that already conferred by *chaebol* status.

The ratio of non-bond interest expense to bank loan across firms is no higher for non-*chaebol* firms than for *chaebol* firms over the whole sample period. However, there is evidence of significant gain in power by main banks against *chaebol* firms in Korea during corporate restructuring during the post-crisis period in terms of the rate charged on loans. The loan rate charged *chaebol* firms relative to that charged non-*chaebol* firms rises sharply after the Asian financial crisis. Although evidence of dilution of the *chaebol* advantage in terms of compensating balance requirements in the post-crisis period is not

statistically significant, *chaebol* firms go from being charged significantly lower loan rates than non-*chaebol* firms in the pre-crisis period to the reverse in the post-crisis period. During corporate restructuring in the post-crisis period banks are able to charge client *chaebol* firms higher loan rates than they charge non-*chaebol* firms. Our post-crisis results are consistent with the findings by Weinstein and Yafeh (1998) and Pinkowitz and Williamson (2001) documenting the power of Japanese main banks associated with rent-seeking behavior. We do not find any evidence supporting the view that main banks extract rents from their client *chaebol* firms by requiring either higher compensating balance or higher loan interest rates during the pre-crisis sample period of 1991 to 1996.

Our findings are also broadly consistent with the view by Hoshi, Kashyap, and Sharfstein (1991) who argue that financial ties between main banks and their client firms reduce information asymmetry and incentive problems, allow financial flexibility for firms, so that firms may continue to proceed with ongoing projects. Since *chaebol* firms have close bank-firm relationship, they have less incentive to hoard cash for precautionary needs. Our result is also consistent with the findings by Peterson and Rajan (1994) that small firms with close bank-firm relationship have easier access to credit than those without such relationship although the costs of funds are not significantly lower. They do however find that firms borrowing from banks other than main banks are charged with higher rates.

This paper is organized as follows. In Section 2, we describe characteristics of Korean firms with an emphasis on *chaebol* firms. Section 3 presents the existing literature on the determinants of cash holdings and testable hypotheses in our study. The data and methodology used in our paper are discussed in Section 4. Section 5 presents empirical results, which documents the difference in bank power between *chaebol* firms and non-*chaebol* firms with analysis for the full sample and pre- and post-crisis sub-sample periods. Section 6 investigates why *chaebol* firms have lower level of cash holdings than non-*chaebol* firms. Finally, Section 7 presents concluding remarks.

2. Characteristics of Korean Firms

A *chaebol,* or a business group in Korea, is a giant conglomerate or financial clique, and is unique to the Korean corporate sector and has recently attracted much attention in academia because of their role before and after the financial crisis in Korea.[4] The *chaebol* dominate the Korean economy. Krugman (1998) notes that the top 30 largest *chaebol* companies account for nearly 40% of total economic activity in Korea in 1996. A list of the top 30 *chaebols* in 1996 is provided in Appendix 1. The largest business groups such as *Samsung, Hyundai*, LG, and SK have over 50 affiliated companies. The associated companies may include financial service firms offering a full range of financial services from credit card and insurance to securities underwriting and venture capital. The number of financial arms for each *chaebol* appears in the last column in Appendix 1. The top five *chaebol*, in particular, have a median number of 6 financial arms, while the median for top 30 *chaebol* is 2.

Yoo and Lee (1987) classify *chaebol* into three categories depending on the timing of their formation. *Chaebol* formed in the late 1950s, such as *Hyundai, Samsung*, and *Lucky-Goldstar* (LG), were established by the founder through government support such as disposal of government vested properties. *Chaebol* of the 1960s, such *as Hanjin, Korea Explosive, Hyosung, Sangyoung,* and *Dong-A,* were established as a result of foreign loans. Finally, *Chaebols* of the 1970s, such as *Daewoo, Sunkyong* (SK), *Lotte, Kolon,* and *Doosan,* were formed during a period of economic boom and of unprecedented export growth. Throughout the post-Korean War period the Government has sponsored the formation and growth of *chaebol* to forward rapid economic growth and development.

The business activities of Korean *chaebol* firms are widely diversified. Yoo and Lee (1987) find that, among their sample firms in Korea, 72% of them have run more than two business departments under one umbrella. In *Samsung* group, for example, major manufacturing firms such as *Samsung Electronics, Samsung Heavy Industries,* and *Samsung Chemical* are connected with affiliated firms by providing raw materials and intermediate goods and services like *Samsung Electro Devices,*

[4] The *chaebol* system is similar to the Japanese *keiretsu* with regard to government sponsorship of a long-term main bank-firm relationship, but differs fundamentally in that Korean banks did not own corporate equity.

Samsung Corning, and *Samsung Electro-Mechanics.* This intra-group trade, accompanied by flexible credit terms, creates an internal capital market through accounts receivable and accounts payable. Deloof (2002) points out that the existence of intra-group claims lessens the need for liquid reserves. The third column in Appendix 1 reports intra-group sales in ratio to total sales for each *chaebol*. The average (median) for the intra-group sales to total sales ratio is 17.9 (14.9) percent for the top 30 *chaebols* and 24.5 (19.2) percent for the top 5 *chaebols*.

Despite the size and diversification of the *chaebol*, most *chaebol* affiliated firms are still under the control of the founding family owner. *Chaebol* firms are linked by direct or indirect cross-shareholdings, and a founder-chairman typically serves in the core company. The controlling shareholder in a *chaebol* is usually the CEO and Chairman of the Board; the other members of the board are executives he has selected. There is evidence that the controlling shareholders (owners) of *chaebol* have sought to maximize their influence by enlarging the size of firms and of the group, even at the expense of profitability.[5] The benefits to controlling shareholders include social, political, and economic rewards that are proportional to the scale of operations firms. For example, if a *chaebol* acquires a new business division, the controlling shareholder of the *chaebol* can staff executive positions at the new business division with hand picked subordinates.

Kook, Park, and Lee (1997) report evidence that the fifty largest *chaebols* focused on the firm growth rather than firm value. Choi, Park, and Kho (2000) find that individual non-*chaebol* firms also prefer growth in size to profitability. Ferris, Kim, and Kitsabunnarat (2002) also demonstrate the so-called "profit stabilization hypothesis" where contending Korean firms pursue enlargement rather than maximization of profits. Government economic development plans giving priority in financing to large firms in the export sector, through the provision of low loan rates and forbearance in rolling over

[5] Choi, Park, and Kho (2000) point out that this structure creates a conflict between the interests of the controlling shareholder and the other shareholders of *chaebol* affiliated firms, since projects that advance the interests of the group might be pursued at the expense of particular firm shareholders.

bank loans, have given both *chaebol* and non-*chaebol* firms an added incentive to emphasize growth of sales over profit maximization [6].

The financial system has traditionally been used as an instrument for the Korean Government's economic development policy tools. The government intervened heavily in the banking system to channel credit to desired industries. Moreno (1998) notes that banks were not free to use standard business criteria in evaluating and monitoring projects. Most commercial banks were nationalized in the early 1960s, and the government influenced the allocation of credit both directly through the appointment of bank management and credit controls, and indirectly through various regulations and incentives. Although a privatization program started in the earlier 1980s resulted in widely dispersed ownership of many commercial banks, government continued to exercise de facto control of most banks though the late 1990s and competition in the banking system continued to be limited.[7] The result was a tightly controlled government-administered financial system characterized by a chronic excess demand for credit, even by profitable and viable firms. Borensztein and Lee (2000) provide evidence of inefficient credit allocations among Korean manufacturing sectors for the period from 1970 to 1996 by comparing performance of firms and their ability to obtain credit. Furthermore, there is the pervasive expectation that troubled borrowers and lenders would benefit from government bailouts, thus aggravating inherent adverse selection and moral hazard in the market for credit.

In summary, Korean *chaebol* firms are nurtured by the government, highly diversified, dominate the economy, controlled by a founding family, and draw more credit from banks than their relatively poor profit opportunities would in many cases justify.

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[6] Most commercial banks were under government control in Korea. An example of one of the few commercial banks free from government control is Shinhan Bank, established by Korean Japanese investors in 1982.

[7] A number of researchers, including Berg (1999), Furman and Stiglitz (1998), and Radelet and Sachs (1998), argue that the combination of strong government and weak financial institutions exacerbated adverse selection and moral hazard in credit allocation in the period leading up to the financial crisis in 1997.

3. Determinants of Cash Holdings

We use the determinants of cash holdings found in the previous studies as controls to investigate the relation between cash holdings, interest expenses, and *chaebol* association. Determinants of cash holdings can be grouped into three categories: Transactional motives; Precautionary motives; Financing motives.

3.1. Transactional Motives

Cash is primarily needed to satisfy transactional motivation. Since cash inflows and outflows are not perfectly synchronized, some level of cash holding is needed to serve as a buffer. As the conversion of long-term investments to readily available cash is costly, a trade off has to be made between the cost and benefit of holding cash. This trade off leads to an optimal cash holdings of a firm, which several models including Baumol (1952) and Miller and Orr (1966) describe. In this paper, we use the size of the firm and net working capital as a proxy for the transactional motives.

Firm size: Baumol (1952) and Miller and Orr (1966) argue that firms with higher demand for transaction will hold relatively lower cash holdings. Barclay and Smith (1995) also state that larger firms have smaller cost of external financing because of the scale economy resulting from a substantial fixed cost component of security issuance costs. Since larger firms tend to have more transactions and greater economies of scale in cash management, we would expect a negative relationship between firm size and investment in liquid assets.

Net working capital: Net working capital could work as a good substitute of liquidity. Firms may choose to ensure themselves against losses by holding liquid assets besides cash. For example, it is common for firms to sell off non-core assets in periods of economic distress. It is also becoming increasingly frequent for firms to liquidate receivables through factoring or securitization as a means of raising liquidity.

3.2. Precautionary Motives

In an uncertain world with volatile cash flows, a firm would keep more liquid reserves as a precautionary motive against an unexpected shortfall in cash flows. The higher the uncertainty associated with expected cash flows, the more precautionary liquid reserves the firm will keep. Similarly, informational asymmetry would explain the precautionary needs for cash holdings. Diamond (1984) and Stiglitz and Weiss (1981) note the informational asymmetry costs associated with bank lending. They argue that a higher level of informational asymmetry between the firm and the lender will lead the bank more difficult discern the credit quality of their client firms. Because of a possible credit rationing by banks, firms may decide to hold cash for precautionary reasons. We use the volatility of cash flows and R&D cost as proxy for the precautionary motive.

The volatility of cash flow (Industry Sigma): As we discussed above, the firms with relatively high volatility in cash flow hold more cash as a precaution. Considering that Korean capital market is not well developed, we expect that the effect of the volatility of cash flows on cash holdings would be significant for Korean firms. We use industry cash flows volatility (industry sigma) as a measure of risk that a firm in an industry faces short falls in cash flows.

R&D/sales: Research and development (R&D) to sales ratio is used as a proxy for information asymmetry. Capital expenditures and research and development expenditures have different meanings especially in terms of asymmetric information. Firms with high capital expenditures are considered to be involved in clearly defined projects that outside investors can easily verify, reducing information asymmetries as in Myers and Majluf (1984). In contrast, R&D-intensive projects almost by definition generate information asymmetries, as it is difficult to verify progress, and the act of revealing information to the market may benefit the firm's competitors and reduce the value of the project.[8] As discussed by Titman and Wessels (1988), R&D expenditures can measure the degree of product specialization, which may increase information asymmetry between the lender and the firm. Opler and Titman (1994) further provide evidence that firms with high R&D/sales are more vulnerable to financial distress. Thus, firms

[8]See Zeckhuaser and Pound (1990) for the list of industries, which have high degrees of asymmetry information based on R&D intensity (i.e., R&D to sales ratio). For example, pharmaceutical industry has very high R&D

with higher R&D would have higher cash holdings to avoid financial distress caused by information asymmetry.

3.3. Financing Motives

Baskin (1987) argues that in a competitive market condition where the speed of investment greatly matters, funds invested in liquid assets, so-called internal capital hold the key advantage of instant availability. Financing motive can be also explained by employing the pecking order theory. Asymmetric information may lead to financing constraints and to pecking order behavior as described by Myers and Majluf (1984). Firms have a certain pattern of long term financing as sources of funds. The pecking order theory contends that firms prefer internal capital to external financing, and if a funding requirement exceeds retained earnings, debt issues are preferred to equity issues. The pecking order theory implies that if internally generated cash is insufficient to finance investment outlays, the firm will first draw funds from its liquidity reserves before raising funds externally.[9] We use the following variables as proxies for financing motives.

Leverage: Korean firms have been highly levered during our sample period along with the high costs of borrowing. The opportunity costs of holding cash are even higher for firms with high leverage since they may have to pay higher interest rate on their borrowings than firms with low leverage. Thus, firms would hold less cash when their leverage is high.

Market to book value: High growth firms are expected to have more positive NPV projects and have more to lose in case of a cash shortage. These firms will be inclined to hold more capital in the firm in order to be able to finance future investment opportunities. Market to book ratio is a proxy for Tobin's Q representing the growth opportunity of firms. An increase in the number of profitable investment opportunities means that the firms have to give up better projects when there is a cash shortage. Thus, firms with higher market to book value would have larger cash holdings.

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intensity which the significant informational opaqueness in this industry.

[9] Some researchers have identified firms with limited access to public financial markets as those most likely to face

Cash flow: Cash flows have an ambiguous effect on cash holdings. Large cash flow may imply that firms do not have to hold large cash within the firm since firms can use cash flows to finance projects. However, it may also imply that firms maintain large cash holdings if firms do not use large proportion of internally generated funds in the same period. Therefore, high cash flows may or may not lead to higher liquid reserves.

4. Sample and Regression Model

4.1. Sample Collection

We use a unique data set provided by Seoul-based Korea Information Service (KIS) for all industrial firms listed in Korea Stock Exchange (KSE) and KOSDAQ stock market from 1991 to 2000.[10] KIS is the leading provider of credit related information and services for financial and commercial business transactions among corporations and consumer individuals in Korea. Most previous studies on Korean firms employ PACAP database, but PACAP Korea database provides only limited information on accounting and stock prices. For example, research and development (R&D) expenditures and account receivables from affiliated firms are not available from PACAP database for Korea. Unlike the PACAP database, our data from KIS contains comprehensive financial information for each KSE and KOSDAQ firm. The company profile and financial information data are compiled from financial statements, business reports, and audit reports that every company is mandated to produce on an annual basis. Financial service firms are excluded in our sample since the motivations of holding cash for financial institutions are different from those for non-financial firms. Banks, for instance, may carry cash to meet capital requirements such as BIS ratio. Also the accounting practices of banks are different from those of firms in other industries.

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cash flow constraints. (Whited (1992), Gilchrist and Himmelberg (1995)).

[10] KOSDAQ stock market is the Korean version of the NASDAQ market where a large number of fast-growing young technology firms are listed. Interestingly, the bubble burst in KOSDAQ market around the same time it did in early 2000.

We use the year-end Korean Consumer Price Index to deflate total assets in 2000 Korean won. We select total of 6878 firm-year observations between 1991 and 2000. Among those 6878 observations, 843 firm-years are classified as *chaebol* firm observations and the remainder of 6035 firm-years as non-*chaebol* observations. We use the Korea Fair Trade Commission (KFTC)'s annual report and Financial Supervisory Commission's 1996 guideline to identify whether firms are affiliated with *chaebol* or not.[11]

4.2. Regression Models

4.2.1. Cash Holdings and Net Assets

We employ regression analysis similar to those used by Opler, Pinkowitz, Stulz, and Williamson (1999) and Pinkowitz and Williamson (2001). The dependent variable is logarithm of cash ratio as in Opler et al. (1999) and Pinkowitz and Williamson (2001). We use a dummy variable for the *chaebol* firms. This dummy variable will reflect the impact of main bank association on the cash holdings. In addition, we employ all potential determinants of cash holdings as controls. Thus, our basic regression equation is the following:

$$LNCASHASSET_{it} = \beta_0 + \beta_1 CHAEBOL_{it} + \beta_2 LNSIZE_{it} + \beta_3 MB_{it} + \beta_4 CF_{it} + \beta_5 NWC_{it} + \beta_6 LEV_{it} + \beta_7 CAPEXP_{it} + \beta_8 R\&D_{it} + \beta_9 DIV_{it} + Year_t + Ind_t + \varepsilon_t \quad (1)$$

where *LNCASHASSET* is log of cash divided by net assets (assets-cash). *CHAEBOL* takes a value of one if a firm is in *chaebol* and zero otherwise. *LNSIZE* is logarithm of total assets. *MB* is the sum of book value of assets and market value of equity minus book value of equity divided by book value of total assets. *CF* is the sum of operating income and depreciation divided by net assets. *NWC* is defined as current assets minus current liability minus cash divided by net assets. We remove cash from net working capital in order to avoid the impact of cash included in working capital. *LEV* is the sum of long-term debt

[11] KFTC legitimately defines a business group as "a group of companies, more than 30 percent of whose shares are

and short-term debt divided by total assets. *CAPEXP* is the sum of changes in fixed asset and depreciation divided by net assets. *R&D* is research and development cost divided by net assets. When R&D is listed as missing, it is set to zero in order to maintain the firm-year in the sample. *DIV* takes a value of one if dividends are paid out and zero otherwise. We include year dummy variables (*Year*) to account for macroeconomic effects as in Pinkowitz and Williamson (2001). In addition, we include dummy variables for each industry (*Ind*) to control for industry effects. We use 2-digit standard industry code to define industry.

4.2.2. Compensating Balance and Bank Loans

Despite the lower cash holdings level for *chaebol* firms, one may still argue that main banks may extract rents from *chaebol* firms using other means. In order to investigate how the main bank might extract rents from their client firms, we also examine the relation between the ratio of *compensating balance* to bank loans and *chaebol* affiliation. *Compensating balance* is technically defined as the sum of other (interest-bearing) deposits (such as savings deposits) and short-term financial instruments (such as time deposits or certificate of deposits). When the government regulates the spread between official deposit and lending rates, banks may use *compensating balance* to extract rents from their client firms. For example, banks may ask their client firms to purchase time deposits or other bank products when they make loans to those firms. The amount banks ask to be placed on deposits can come close to one-quarter of the loan amount for some firms. Banks then turn, and make new profitable loans to other clients with those deposits. We predict that if main banks have power over their client firms, these firms would have a higher compensating balance to bank loans ratio than firms without main banks.

Although there has been a set margin for banks' pricing due to regulation, banks have been effectively extracting rents to assume higher risks for firms with lower credit worthiness. In other words, regardless of the credit worthiness, Korean banks have generally been offering similar rates to their

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owned by some individuals or by companies controlled by those individuals" The KFTC identifies business groups and announces them every year.

borrowers, but historically asked small borrowers to set aside substantial portion of their loans as deposits, which then can be assumed by banks as collateral. For example, when a small firm borrows $ 2 million at 10%, it might be forced to purchase $ 1 million of CDs at 5%. This indicates that the firm will need to generate returns for more than 15% out of the $ 1 million loan that the firm is actually using. If main banks use the compensating balance as a way of raising the effective interest rate, the level of interest bearing deposits would be higher relative to firms' bank loans even though it is not higher relative to net assets. This measure as a proxy for bank power is more appropriate for firms with small bank loans relative to their assets. Furthermore, the ratio would be lower for *chaebol* firms than non-*chaebol* firms if main banks can not impose more compensating balance to their *chaebol* client firms.

We use the same format with regression (1) but we replace *LNCASHASSET* with *LNCBLOAN* which is log of cash divided by bank loans in regression (2).

$$LNCBLOAN_{it} = \beta_0 + \beta_1 CHAEBOL_{it} + \beta_2 LNSIZE_{it} + \beta_3 MB_{it} + \beta_4 CF_{it} + \beta_5 NWC_{it} + \beta_6 LEV_{it} + \beta_7 CAPEXP_{it} + \beta_8 IS_{it} + \beta_9 R\&D_{it} + \beta_{10} DIV_{it} + Year_t + Ind_t + \varepsilon_t \quad (2)$$

where *LNCBLOAN* is log of the ratio of the compensating balance to average bank loan. Average bank loan is defined as the sum of bank loans at the beginning and at the end of the fiscal year divided by 2.

In order to tell whether the cash holdings in the pre-crisis period partly represent compensating balances, we divide the sample period and run the regressions (2) separately for each sub-period. The pre-crisis subperiod is between 1991 and 1996, and the post-crisis subperiod is between 1997 and 2000. Since the financial crisis of 1997, charging higher interest rate has been easier for Korean commercial banks, suggesting some practical gain in bank power. Furthermore, the reduction in the compensating balance ratio from pre- to post-crisis period would be larger for non-*chaebol* firms than for *chaebol* firms if banks extracted much rents from non-*chaebol* firms than *chaebol* firms during the early 1990s.

4.2.3. Non-Bond Interest Expenses and Bank Loans

One important empirical implication that Weinstein and Yafeh (1998) provide is that the availability of funds and costs of funds are two separate issues, and firms may not have both in their favor. In other words, firms with close ties to main banks in Japan may have easy access to credit, but they are charged higher because banks have power against them. Weinstein and Yafeh (1998) show that main bank client firms pay 4.66%, while unaffiliated firms pay only 3.96% where the interest rate is defined as non-bond interest expenses divided by non-bond liabilities.

Even though it is unlikely, it is possible that main banks in Korea charge higher interest rate to their client *chaebol* firms than non-*chaebol* firms instead of imposing compensating balance. In order to test this possibility, we employ regressions similar to that of Weinstein and Yafeh (1998).

$$LNINTLOAN_{it} = \beta_0 + \beta_1 CHAEBOL_{it} + \beta_2 LEV_{it} + \beta_3 OI_{it} + \beta_4 LNSALE_{it} + Year_t + Ind_t + \varepsilon_t \quad (3)$$

where *LNINTLOAN* is the log of the ratio of non-bond interest expenses to bank loan, *OI* is operating income over sales, and *LNSALE* is log of sales.

5. Empirical Results

5.1. Univariate Analysis of Korean Firms

The summary statistics of cash to net-assets ratios are reported in Table 1. In contrast to the predictions of the main bank monopoly hypothesis, we find that *chaebol* firms have significantly lower cash holdings than non-*chaebol* firms. Panel A of Table 1 shows that the mean and median cash holdings for the whole sample period are 9.5 percent and 5.8 percent of net assets respectively while Panel B shows that the mean and median cash holdings for non-*chaebol* firms are 10.1 percent and 6.3 percent of net assets respectively. That is, we find lower mean and median cash holdings for *chaebol* firms in Panel C of Table 1. Table 1 shows that *chaebol* firms hold an average 2 to 6 percent lower cash holdings than non-*chaebol* firms through out the sample period. This result is consistent with the findings by Hoshi et al.

(1991) showing that keiretsu firms are less liquidity constrained than non-group firms because of the financial flexibility granted by main banks.

In order to investigate whether we find lower cash holdings for *chaebol* firms because our sample period includes the year of Asian Financial Crisis, we also examine the cash ratios of *chaebol* and non-*chaebol* firms each year. Pre- and post-crisis analyses of cash ratios present results consistent with the analysis of the whole sample period: Cash holding of *chaebol* firms is lower than that of non-*chaebol* firms. However, both *chaebol* and non-*chaebol* firms hold very low levels of cash after the crisis of 1997. This implies that the instability of financial market, reflected in extremely high and volatile interest rates, have increased the opportunity costs of holding cash rather than that banks have less power in the post-crisis period. Our univariate analysis of cash holdings for *chaebol* firms suggests that cash ratios reflect various aspects of firm business environment including earnings prospects and macroeconomic circumstances. Therefore, it is too equivocal to say with our sample that the higher level of cash holdings is associated with bank power without any benchmarks. In Section 5.2, we will employ several measures for bank power and test main bank relationship and bank power.

We present important financial differences between *chaebol* and non-*chaebol* firms in Table 2. We first find that *chaebol* firms are significantly larger than non-*chaebol* firms in size. The average (median) size of total assets of *chaebol* firms is almost 4 (9) times larger than that of non-*chaebol* firms. This is hardly surprising, however, given the managerial objectives of growth and diversifying efforts widespread among *chaebol* firms in the Korean economy. The market-to-book ratios are higher for non-*chaebol* firms than *chaebol* firms, suggesting that the growth opportunity is higher for non-*chaebol* firms than *chaebol* firms in Table 2. We also find that *chaebol*–affiliated firms have significantly lower cash flows returns than non-*chaebol* firms. Weinstein and Yafeh (1998) argue that Japanese main bank client firms show poor performance due partly to main banks' risk aversion and partly to main banks' rent extractions. We further offer an over-investment problem as possible a reason for poor performance by *chaebol*-affiliated firms in our sample since

Table 2 also shows that *chaebol* firms spend more on capital expenditures than do non-*chaebol* firms. This may suggest that *chaebol* firms invest in less lucrative projects, supporting the view of over-investment hypothesis in Korea by Shin and Park (1999). Consistent with the result for cash ratio, *chaebol* firms hold less working capital as a substitution of cash. We have negative working capital because it is defined as current assets minus current liabilities minus cash. The leverage is significantly higher for *chaebol* firm than for non-*chaebol* firms. However, the ratio of bank loans to total debt is lower for *chaebol* firms than for non-*chaebol* firms. However, R&D investment is slightly lower for *chaebol* firms than for non-*chaebol* firms.

The last three rows of Table 2 present the summary statistics of cash holdings normalized by net assets, compensating balance normalized by the average bank loan, and non-bond interest expenses normalized by average bank loan. As it is shown in Table 1, non-*chaebol* firms hold larger cash holdings than *chaebol* firms, and it is true even when we use average bank loans to normalize compensating balance. We can also find that there is a significant difference in the ratio of compensating balance to average bank loan between *chaebol* firms and non-*chaebol* firms. The median compensating balance ratio for *chaebol* firms is 10.6%, while that for non-*chaebol* firms is 24.8%. This indicates that for non-*chaebol* firms, they might be forced to place as much as a quarter of their outstanding bank credit. Finally, the last row in Table 2 shows that the median non-bond interest expenses to bank loan ratios for *chaebol* firms and non-*chaebol* firms are close to each other. This is consistent with the notion that the nominal borrowing rates for firms in Korea are similar regardless of the credit worthiness due to regulatory arrangement.

In summary, the results of the summary statistics describe *chaebol* firms are on average significantly larger than non-*chaebol* firms, but are more levered, less liquid, and valued less than non-*chaebol* firms by the market. *Chaebol* firms seem to have less growth opportunities than non-*chaebol* firms in spite of a higher level of capital expenditure, while these are consistent with the low level of the R&D intensity.

5.2. Regression Analysis of Cash Holdings

5.2.1. Cash Holdings and Net Assets

Table 3 shows that the coefficient of each variable is consistent with the theoretical predictions we have discussed earlier. We employ OLS pooled regressions with year dummies (Regression I) and with both year and industry dummies (Regression II). In addition to the OLS pooled regression, we also employ Fama and MacBeth (1973) regression (Regression III) because OLS pooled regression may violate the independently and identically distributed error assumption. Fama-MacBeth regression eliminates the problem of serial correlation in the residuals of a time-series cross-sectional regression. Each year, we run cross-sectional regressions, and then use the time series of the regression coefficients to make any inference by taking the average. The coefficient of *chaebol* dummy is significant and negative across different regression methods. That is, we confirm the result of univariate analysis that firms that are members of the top 30 largest *chaebol* hold less cash than non-*chaebol* firms even after controlling for other determinants of cash holdings.

The coefficient of firm size is consistently negative across the regression methods applied here, which implies that there are economies of scale in cash management of Korean firms in accordance with theory of Baumol (1952) and Miller and Orr (1966). In other words, for a transactional motivation, larger Korean firms would have less cash holdings to assets, consistent with results of the U.S and Japanese firms, but contrary to that of the German firms.

Korean firms' cash holdings are also affected by the financing motivation. Consistent with the pecking order theory, Korean firms have higher level of leverage when internal cash holding level is low. A negative relation between leverage and cash holdings also supports the view that firms would rather reduce debt than hold more cash holdings when leverage is high as in Myers and Majluf (1984). Also, consistent with the financing motivation, a firm with a high market to book ratio shows higher cash holdings levels. This indicates that firms with high growth potential hold more cash in order to ensure that

they will be able to realize expected future profit, even in the status where external capital becomes difficult to obtain.

It is evident that cash flow has a significant positive association with cash holdings. This may support the argument that credit market frictions are prevalent and are hence responsible for the high correlation between cash flow of the firm and its own cash holdings. The coefficient of net working capital could affect either positively or negatively on cash holdings. In the case of Korean firms, coefficient of net working capital is significantly negative in Regressions II and III, suggesting that the effect of net working capital as a substitute of cash and marketable securities overwhelms the effect of conversion cycle. This is consistent with results for the U.S and Japan. For German firms, net working capital is insignificant. It seems that Korean firms' cash holdings are positively related to the transactional motivation, when motivation is proxied by the firm size and net working capital.

Firms in Korea have a negative relationship between capital expenditures and cash holdings. This suggests that firms with better investment opportunities invest more, and they hold less cash internally. The coefficient of R&D intensity is significant in OLS pooled regressions I and II, but is insignificant in F-M regression III. It appears that this is driven by only a few observations with a substantial of R&D expenditures compared to the U.S and Japan. More than half of our sample firms report very little R&D expenditures. Positive and significant coefficient of dividend dummy indicates that firms paying dividends have larger cash holdings.

In summary, we find from the cash regressions results that *chaebol* firms hold significantly less cash than non-*chaebol* firms even after controlling for the effects of numerous determinants of cash holdings. With regard to the other determinants, we find that cash holdings of Korean firms increase with the market to book ratio, cash flow, and dividend. However, cash holdings of Korean firms decrease with firm size, net working capital, leverage, and capital expenditures.

5.2.2. Compensating Balance and Bank Loan

Table 4 presents estimation of compensating balance to bank loan ratio regressions. We again employ OLS pooled regressions with year dummies (Regression I), with both year and industry dummies (Regression II), and Fama and MacBeth (1973) regression (Regression III). Although we normalize the compensating balance by average bank loan, the coefficient of *chaebol* dummy is negative and significant in all three regressions in Panel A of Table 4. The coefficients of firm size and leverage variables are negative and significant in all three regressions as they are in Table 3. This indicates that larger firms hold less cash for each dollar of bank loan possibly due to their bargaining power against banks, and highly levered firms hold less cash possibly due to higher opportunity cost of holding cash.

In order to test the hypothesis that Korean banks gained power over their client firms during the corporate restructuring after the Asian financial crisis in late 1997, an interaction term (CHAEBOL x Post), which takes a value 1 for *chaebol* firms during 1997 to 2000 and zero during 1991-1996, is added to the regression models in Panel B of Table 4. If banks gained power against *chaebol* firms during the restructuring process of the corporate sector after the crisis, the "magnitude" of the negative relationship between compensating balance to bank loan ratio and *chaebol* affiliation should be smaller in the post-crisis period than in the pre-crisis period. Consistent with a gain in power by banks relative to the *chaebol* firms in the post-crisis period, the coefficient of the interaction term is positive. However, the coefficient of the interaction term is statistically insignificant suggesting that the effect of the *chaebol* dummy on the compensating balance to bank loan ratio is not significantly different in the post-crisis period from that in the pre-crisis period.

5.2.3. Non-Bond Interest Expenses and Bank Loan

In this section, we explore whether the cost of borrowing for *chaebol* firms is higher than that for non-*chaebol* firms. Instead of requesting that their client firms hold larger cash balances or compensating balances at the bank, main banks in Korea may charge higher interest rate for *chaebol* firms than for non-

chaebol firms if they have monopoly power. Weinstein and Yafeh (1998) report evidence that main banks in Japan charge higher interest rates to firms with close ties.

Panel A of Table 5 shows that the coefficients for *chaebol* dummy are not significant in the three regression models (with year dummies, with year and industry dummies, and in the Fama-MacBeth regression). The results in Panel A suggest that main banks do not charge different loan rates between *chaebol* and non-*chaebol* firms. In Panel B of Table 6 we report results when an interaction term (CHAEBOL x Post) to capture differential effects in loan rates between the pre-crisis and post-crisis periods is added to equation (3). The differential loan rate charged by banks to *chaebol* firms compared to non-*chaebol* firms in the pre-crisis period is given by the coefficient on the *chaebol* dummy. The differential loan rate charged by banks to *chaebol* firms compared to non-*chaebol* firms in the post-crisis period is given by the sum of the coefficients on the *chaebol* dummy and on the interaction term (CHAEBOL x Post). If the differential loan rate charged by banks to *chaebol* firms is not different between the pre-crisis and post-crisis periods, the coefficient on the interaction term (CHAEBOL x Post) will not be statistically different.

The results in Panel B of Table 5 show that the interaction term (CHAEBOL x Post) is highly statistically significant, suggesting a sharp change in the differential loan rates charged by banks to *chaebol* firms compared to non-*chaebol* firms between the pre-crisis and the post-crisis periods. The coefficients for CHAEBOL are significant and negative, indicating that in the pre-crisis period, banks charged lower loan rates to *chaebol* firms than to non-*chaebol* firms. In contrast, the differential loan rate charged by banks to *chaebol* firms compared to non-*chaebol* firms in the post-crisis period, given by the sum of the coefficients on the *chaebol* dummy and on the interaction term (CHAEBOL x Post), is positive and statistically significant in Regression I and II.

The results in Table 5 indicate that interest rates are significantly lower for *chaebol* firms than for non-*chaebol* firms during the pre-crisis period, while the pattern is significantly reversed during the corporate restructuring in the post-crisis period. The evidence in Table 5 for the post-crisis period is supportive of the greater main bank power hypothesis and is consistent with the empirical findings for

main bank power against Japanese firms by Weinstein and Yafeh (1998) and Pinkowitz and Williamson (2001).

6. Why Are Cash Holdings Lower for *Chaebol* Firms?

In the previous section, we show evidence consistent with the hypothesis that main banks in Korea extract rents from their client *chaebol* firms during the post-crisis period using the non-bond interest rates as a proxy for bank power. In this section, we investigate why chaebol firms' cash holdings are still lower than non-*chaebol* firms even after the financial crisis considering that the level of cash holdings is a proxy for bank rent extractions. First, we argue that *chaebol* firms have better access to external capital so that Korean main bank does not have monopoly power against *chaebol* firms. As shown in Appendix 1, most *chaebol* group firms have financial services arms such as securities, insurance, or finance companies. Thus, it is evident that *chaebol* firms with financial services arms have greater advantage in financing than other *chaebol* firms (recall that our *chaebol* classification is the top 30 group classified by KFTC). In order to see whether financial arms of *chaebol* firms can substitute somehow the role of main banks, and explain cash holding patterns of Korean firms between *chaebol* and non-*chaebol,* we divide firms affiliated with top 30 *chaebols* into two groups: group of *chaebol* firms which have financial services arms; the other group has no financial arms.

In order to see whether those *chaebol* firms with financial arms have significantly lower cash holdings than other *chaebol* firms, we add one additional dummy variable, FINARMS, to regression model (1):

$$LNCASHASSET_{it} = \beta_0 + \beta_1 FINARMS_{it} + \beta_2 CHAEBOL_{it} + \beta_3 LNSIZE_{it} + \beta_4 MB_{it} + \beta_5 CF_{it} + \beta_6 NWC_{it} + \beta_7 LEV_{it} + \beta_8 CAPEXP_{it} + \beta_9 R\&D_{it} + \beta_{10} DIV_{it} + Year_t + Ind_t + \varepsilon_t \quad (4)$$

where all other variables are defined in the model (1) in the previous section. If cash holdings are partly determined by *chaebol*'s ownership of financial arms, the coefficient of financial arms dummy,

FINARMS, would be negative and significant, and it is consistent with the notion that *chaebol* firms reduce their cash holdings using their financial arms.

For regression model (4), we run all three types of regressions used in the previous section and find that the coefficient of FINARMS is not significant in any regression. Even though it is highly likely that *chaebol* firms with financial arms can access external funds more easily than other *chaebol* firms, regression results do not show evidence supporting the notion that financial arms reduce cash holdings of *chaebol* firms.

Another possible explanation consistent with the results in the previous section is that *chaebol* firms have better access to commercial paper markets and short-term corporate bond markets. The proportion of direct financing to total liability would be higher for *chaebol* firms than for non-*chaebol* firms so that *chaebol* firms might have bargaining power against their main bank. It is also argued that the corporate bond markets are better facilitated after the financial crisis. Since *chaebol* firms have easier access to bond markets than non-*chaebol* firms, *chaebol* firms are expected to have lower bank loan to total liability ratio than non-*chaebol* firms, and the difference would be even greater in the post-crisis period.

Consistent with this prediction, we find (in results not reported) that the ratio of bank loan to total liability is lower for *chaebol* firms than for non-*chaebol* firms, and the difference is larger in the post-crisis period than in the pre-crisis period. This finding supports the notion of Diamond (1991) that borrowers will start building their reputation by having monitored borrowing, and later move onto issuing directly placed debt. The median ratio of bank loan to total debt is 41.8 percent and 40.4 percent for *chaebol* firms and non-*chaebol* firms respectively before 1997 while it is 34 percent and 42.5 percent for *chaebol* firms and non-*chaebol* firms respectively after 1997. The difference is significant at one percent level after 1997.

We use the following regression model to capture the effect of existence of corporate bond in the liability structure on cash holdings where the corporate bond is used a proxy for firm's ability to access bond markets:

$$LNCASHASSET_{it} = \beta_0 + \beta_1 BONDDUM_{it} + \beta_2 CHAEBOL_{it} + \beta_3 LNSIZE_{it} + \beta_4 MB_{it} + \beta_5 CF_{it} + \beta_6 NWC_{it} + \beta_7 LEV_{it} + \beta_8 CAPEXP_{it} + \beta_9 R\&D_{it} + \beta_{10} DIV_{it} + Year_t + Ind_t + \varepsilon_t \quad (5)$$

where BONDDUM takes value of one if a firm has positive amount of bond, and otherwise zero, and other variables are defined in the model (1) in the previous section. C*haebol* firms are more likely to raise funds in the bond market than are other firms. In the full sample BONDDUM has mean 0.837 for *chaebol* firms and mean 0.566 for other firms. Interestingly, a smaller proportion of firms raise funds in the bond market after the 1997 crisis than before the crisis, particularly in the case of non-*chaebol* firms. The mean of BONDDUM falls from 0.847 to 0.825 for *chaebol* firms and from 0.699 to 0.457 for non-*chaebol* firms over the pre- and post-crisis sub-periods. This indicates that the access to capital market has become substantially harder for non-*chaebol* firms after the crisis.

The results from estimating equation (5) are reported in Panel A of Table 6 for the full sample. Panel B reports results when an interaction term (CHAEBOL x Post) to capture differences in the effect of *chaebol* dummy between pre-crisis and post-crisis samples. The results from estimating equation (5) for the pre-crisis and post crisis periods separately are reported in Panels C and D of Table 6, respectively. We find that the coefficient of BONDDUM is significantly negative in the full sample and both the pre- and post-crisis sub periods even after controlling for *chaebol* dummies. This indicates that *chaebol* and non-*chaebol* firms with access to the bond markets maintain lower cash holdings than do firms without such access. In the pre-crisis period, the coefficients of BONDDUM are negative and statistically significant across all regressions, but the magnitude of the coefficients is smaller than for post-crisis period. This may indicate that the privilege of easy access to the bond market in the post-crisis period is especially valuable and help reduce hoarding cash for precautionary needs.

The coefficient on CHAEBOL remains statistically significant in all regressions and across all samples that include BONDDUM in Table 6. The statistical insignificance of the interaction term (CHAEBOL x Post) in Panel B indicates no significant difference in the effect of the *chaebol* dummy on cash holdings between the pre-crisis and post-crisis periods. Thus, *chaebol* firms have significantly lower

cash balances than non-chaebol firms even after controlling for access to the bond market. Also, inclusion of BONDDUM does not reduce the magnitude of the effect on cash holdings of *chaebol* status, as comparison of results in Table 3 with those in Table 6 attest. Access to the bond market would seem to reduce cash holdings by about half the reduction brought by *chaebol* status based on the OLS regressions for the full sample (and about one-quarter less based on the Fama-MacBeth regression).

7. Conclusion

This paper investigates the effect of main bank relationship on the cash and other deposits holdings, and on the cost of borrowings using all listed *chaebol* and non-*chaebol* industrial firms in Korea. We find that the level of cash holdings is lower for *chaebol* firms than for non-*chaebol* firms during the 1990s. In addition to cash holdings, we also examine the ratio of compensating balance to bank loan and the ratio of non-bond interest expenses to bank loan. We find that the ratios are significantly lower for *chaebol* firms than for non-*chaebol* firms in the univariate analysis, while various regression analyses indicate that there has been some shift in bank power against their clients firms over the last decade.

Unlike Japanese main banks, which have power over their related firms, Korean main banks seem to be too weak to extract rents from their client firms especially during the pre-crisis period. We find that firms in the top 30 *chaebols* are able to avoid compensating balance requirements imposed by banks on other less prestigious firms. A major reason for this result has to lie with the effective government influence on banks in Korea and government policy of favorable treatment for the largest *chaebol* as a means of achieving rapid economic development. We investigate why main banks in Korea do not extract rents from their client firms using their long-term relationship, and find that the ability to access bond market significantly reduces cash holdings. The ratio of direct finance to total liability is significantly higher for *chaebol* firms than for non-*chaebol* firms and this may explain why main banks are unable to extract rents. However, it is found that although firms raising funds through issuing bonds hold lower cash balances, *chaebol* firms continue to hold lower cash balances than other firms with equal status on

this dimension. Access to the bond market reduces cash holdings by about half the reduction brought by *chaebol* status. Some c*haebol* firms can potentially benefit from financial services arms. However, it is found that availability of a financial arm does not affect cash holding by c*haebol* firms.

Many claim that Korean banks have gained power over their client firms during the restructuring process of the corporate sector after the Asian financial crisis since late 1997. There is evidence (not statistically significant) of a reduction in the magnitude of the negative relationship between compensating balance to loan ratio and firms with *chaebol* affiliation in the post-crisis period, although whether this reflects some increased bank power, or simply deteriorated liquidity constraint given much higher interest rates during 1997-2000 is unclear. We find that the loan rate charged to *chaebol* firms relative to that charged to non-*chaebol* firms rises sharply after the Asian financial crisis. During 1997-2000, bank power arguments by Weinstein and Yafeh (1998) and Pinkowitz and Williamson (2001) may apply, concerning the association of higher interest rates charged by main banks to client firms with *chaebol* affiliation, suggesting main bank power hypothesis at work.

Future research may attempt to provide further evidence that how and why main banks gain power against their client firms in recent years. One possible explanation is the increased power by creditors through the process of debt for equity swap. Therefore, the work examining the relationship between bank equity ownership of client firms and bank power, and the closely related issue of the effect of bank equity ownership on client firm value is an area for fruitful further exploration.

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Appendix 1. Pre-Crisis Top 30 business groups (*chaebols*) in Korea

This table shows main bank information for top 30 *chaebols* before the crisis as of the fiscal year ending in 1996. The table also shows the number of affiliated firms and the amounts of the internal trading that sell and buy goods and services to and from other affiliated firms during the fiscal year 1996. Hanil Bank and Commercial Bank of Korea merged in 2000 to form Hanvit Bank.

Ranking	Name of Chaebol	Main Bank	No. of the affiliated firms	Internal sales / Sales (percent)[12]	No. of affiliated financial arms
1	Hyundai	Korea Exchange	57	17.8	6
2	Samsung	Hanil	80	31.5	8
3	LuckyGoldstar(LG)	Korea First	49	18.8	7
4	Daewoo	Korea First	32	35.4	5
5	S.K	Korea First	46	19.2	2
6	Ssangyong	Cho Hung	25	35.5	5
7	Kia	Korea First	28	19.9	3
8	Hanjin	Hanil	24	5.7	2
9	Korea Explosive	Hanil	31	32.6	6
10	Lotte	Commercial	30	7.1	1
11	Kumho	Cho Hung	26	11.8	2
12	Halla	Korea Exchange	18	29.8	0
13	Doosan	Commercial	25	14.6	2
14	Dong-ah	Commercial	19	0.6	1
15	Daelim	Hanil	21	2.0	3
16	Hansol	Hanil	23	17.8	1
17	Kolon	Hanil	24	5.3	0
18	Jinro	Commercial	24	15.4	2
19	Dongkuk	Seoul	17	6.3	1
20	Kohap	Hanil	13	43.3	0
21	Dongbu	Seoul	34	9.0	8
22	Haitai	Cho Hung	15	5.5	4
23	Newcore	Korea First	18	0.0	5
24	Anam	Cho Hung	21	72.6	1
25	Tongyang	Hanil	24	9.8	0
26	Hannil	Hanil	7	1.0	0
27	Keopyung	Cho Hung	22	15.2	0
28	Miwon	Hanil	25	18.7	5
29	Hyosung	Hanil	18	10.2	0
30	Shinho	Korea First	25	9.3	1
	Average (median)		27 (24)	17.4 (14.9)	2.7 (2)
	Top 5 Average (Median)		53 (49)	24.5 (19.2)	5.6 (6)

[12] The figures are based on Chang and Hong (1998).

Table 1. Summary statistics of cash to net-asset ratio

Cash is the sum of cash on hand (#1100) and marketable securities (#1140) and denominator is net-assets (Asset-Cash). The sample period is from 1991 to 2000. There are 6,878 firm-year observations: 6,035 non-*chaebol* firm-years and 843 *chaebol* firm-years.

Panel A. Whole sample

Year	No. obs.	Mean	Third Quartile	Median	First Quartile
1991	475	0.124	0.148	0.086	0.054
1992	476	0.121	0.144	0.087	0.052
1993	481	0.121	0.146	0.084	0.052
1994	502	0.135	0.166	0.088	0.048
1995	529	0.131	0.161	0.087	0.043
1996	723	0.126	0.165	0.085	0.044
1997	816	0.134	0.159	0.082	0.044
1998	826	0.152	0.172	0.077	0.035
1999	937	0.104	0.118	0.045	0.016
2000	1113	0.083	0.096	0.040	0.014
Total	6878	0.120	0.145	0.073	0.034

Panel B. Non-chaebol firms

Year	No. obs.	Mean	Third Quartile	Median	First Quartile
1991	400	0.131	0.155	0.090	0.058
1992	401	0.128	0.153	0.092	0.056
1993	406	0.129	0.156	0.090	0.057
1994	424	0.145	0.176	0.099	0.055
1995	449	0.141	0.174	0.093	0.048
1996	635	0.135	0.178	0.096	0.052
1997	727	0.142	0.168	0.088	0.046
1998	736	0.162	0.186	0.083	0.036
1999	843	0.110	0.130	0.051	0.017
2000	1014	0.087	0.100	0.043	0.014
Total	6035	0.128	0.155	0.078	0.037

Table 1 (Continued).

Panel C. Chaebol firms

Year	No. obs.	Mean	Third Quartile	Median	First Quartile
1991	75	0.088	0.111	0.073	0.036
1992	75	0.085	0.105	0.071	0.045
1993	75	0.077	0.095	0.058	0.032
1994	78	0.079	0.087	0.048	0.028
1995	80	0.076	0.097	0.050	0.031
1996	88	0.057	0.064	0.034	0.023
1997	89	0.069	0.074	0.049	0.030
1998	90	0.075	0.092	0.047	0.028
1999	94	0.045	0.048	0.027	0.008
2000	99	0.038	0.044	0.020	0.007
Total	843	0.067	0.081	0.044	0.025

Table 2. Descriptive statistics: *Chaebol* firms vs. Non-*Chaebol* firms

Total assets are. First, normalized in year 2000 Korean Won using the year-end Korean Consumer Price Index, then translated into US dollars using Korean Won/ US Dollar exchange at the end of year 2000. Market to Book is defined as (book value of assets-book value of equity + market value of equity)/assets. Cash Flow is defined as (operating income plus depreciation) divided by net assets. Net working capital is defined as (current assets minus current liabilities minus cash) divided by net assets. Total leverage is defined as long-term plus short-term debt/total assets. Capital expenditures are defined as (changes in fixed asset plus depreciation) divided by net assets. Industry is defined as 2 digit of Standard Industry Code of Korea. R&D is R&D divided by net assets. When R&D is listed as missing, it is set to zero. Cash is the sum of cash on hand (#1100) and marketable securities (#1140). Net-assets are assets minus cash. Compensating balance is the sum of other deposits (#1134) and short-term financial instruments (#1220). If compensating balance is missing than compensating balance is equal to the cash (#1100). If compensating balance/average bank loan is greater than 10, we treat them as missing. Interest is interest expenses (#6110).

	All		Non-chaebol		Chaebol		Difference			
	Mean	Median	Mean	Median	Mean	Median	Mean	t-stat	Median	p-value
Total assets (million dollar)	447.6	91.6	306.9	75.9	1455.3	706.5	-1148.4	-14.07	-630.6	0.00
Market to book ratio	1.122	0.960	1.138	0.958	1.006	0.964	0.132	5.15	-0.006	0.48
Cash flow	0.062	0.065	0.062	0.066	0.057	0.059	0.006	2.17	0.007	0.00
Net working capital	-0.004	0.003	0.007	0.014	-0.082	-0.078	0.089	10.71	0.092	0.00
Leverage	0.676	0.650	0.663	0.631	0.768	0.757	-0.105	-9.99	-0.127	0.00
Bank loan / Debt	0.411	0.412	0.414	0.414	0.389	0.396	0.025	4.06	0.019	0.00
Capital expenditures	0.045	0.022	0.044	0.020	0.051	0.033	-0.007	-1.48	-0.013	0.00
R&D / Net assets	0.0015	0.000	0.0016	0.000	0.0010	0.000	0.0006	5.17	0.000	0.00
Cash / Net assets	0.120	0.073	0.128	0.078	0.067	0.044	0.060	17.82	0.035	0.00
Compensating Balance / Avg. bank loan	0.528	0.224	0.570	0.248	0.233	0.106	0.337	14.37	0.143	0.00
Interest / Avg. bank loan	0.378	0.146	0.273	0.145	1.123	0.157	-0.851	-1.01	-0.012	0.00

Table 3. Estimation of cash to net assets ratio regressions

Dependent variable is a logarithm of cash divided by net assets. CHAEBOL is a dummy which takes the value of one if a firm belongs to chaebol, and zero otherwise. LNSIZE is logarithm of total asset. MB is the sum of book value of assets and market value of equity minus book value of equity divided by total assets. CF is operating income plus depreciation divided by net asset. NWC is current assets minus current liability minus cash divided by net asset. LEV is long-term plus short-term debt divided by total assets. CAPEXP is changes in fixed asset plus depreciation divided by net asset. R&D is research and development cost divided by net assets. When R&D is missing, it is set to zero. DIV is a dummy that takes one if dividends are paid out, and zero otherwise. INDUM is a dummy for 2 digit of standard industry code of Korea. Regression I is a cross-sectional time-series regression and includes year dummies. Regression II is a cross-sectional time-series regression and includes year and industry dummies. Regression III is an average of time-series coefficients of Fama-MacBeth cross-sectional regressions. t-stats of Regression III are from time-series coefficients of regressions. t-stats are in parentheses.

$$LNCASHASSET_{it} = \beta_0 + \beta_1 CHAEBOL_{it} + \beta_2 LNSIZE_{it} + \beta_3 MB_{it} + \beta_4 CF_{it} + \beta_5 NWC_{it} + \beta_6 LEV_{it} + \beta_7 CAPEXP_{it} + \beta_8 R\&D_{it} + \beta_9 DIV_{it} + Year_t + Ind_t + \varepsilon_t \quad (1)$$

	Regression I	Regression II	Regression III
CHAEBOL	-0.273 (-5.85)	-0.307 (-6.50)	-0.264 (-5.08)
LNSIZE	-0.149 (-13.65)	-0.148 (-13.11)	-0.114 (-14.62)
MB	0.062 (7.58)	0.050 (6.07)	0.356 (4.68)
CF	1.284 (9.17)	1.358 (9.72)	1.379 (7.10)
NWC	-0.212 (-3.62)	-0.278 (-4.61)	-0.674 (-2.53)
LEV	-0.205 (-5.82)	-0.207 (-5.81)	-0.869 (-4.66)
CAPEXP	-0.305 (-2.74)	-0.314 (-2.82)	-0.622 (-2.55)
R&D	12.190 (5.29)	12.093 (5.26)	5.182 (2.15)
DIV	0.367 (11.34)	0.393 (12.17)	0.274 (6.42)
Year dummy	yes	yes	
Industry dummy	no	yes	
No. Obs.	6821	6821	
Adj R-sq.	0.1945	0.2061	

Table 4. Estimation of compensating balance to bank loan ratio regressions

Dependent variable is a logarithm of compensating balance divided by average bank loan where average bank loan is the average of beginning and ending bank loan. Compensating balance is the sum of other deposits (#1134) and short-term financial instruments (#1220). If compensating balance is missing than compensating balance is equal to the cash (#1100). If compensating balance/average bank loan is greater than 10, we treat them as missing. CHAEBOL is a dummy which takes the value of one if a firm belongs to chaebol, and zero otherwise. CHAEBOL x Post is an interaction term which takes the value of one if a firm belongs to chaebol in the post-crisis period, and zero otherwise. LNSIZE is logarithm of total asset. MB is the sum of book value of assets and market value of equity minus book value of equity divided by total assets. CF is operating income plus depreciation divided by net asset. NWC is current assets minus current liability minus cash divided by net asset. LEV is long-term plus short-term debt divided by total assets. CAPEXP is changes in fixed asset plus depreciation divided by net asset. R&D is research and development cost divided by net assets. When R&D is missing, it is set to zero. DIV is a dummy that takes one if dividends are paid out, and zero otherwise. INDUM is a dummy for 2 digit of standard industry code of Korea. Regression I is a cross-sectional time-series regression and includes year dummies. Regression II is a cross-sectional time-series regression and includes year and industry dummies. Regression III is an average of time-series coefficients of Fama-MacBeth cross-sectional regressions. t-stats of Regression III are from time-series coefficients of regressions. t-stats are in parentheses.

$$LNCBLOAN_t = \beta_0 + \beta_1\, CHAEBOL_{it} + \beta_2\, LNSIZE_{it} + \beta_3\, MB_{it} + \beta_4\, CF_{it} + \beta_5\, NWC_{it} + \beta_6\, LEV_{it} + \beta_7\, CAPEXP_{it} + \beta_8\, R\&D_{it} + \beta_9\, DIV_{it} + Year_t + Ind_t + \varepsilon_t \qquad (2)$$

Panel A: Full sample (1991-2000)

	Regression I	Regression II	Regression III
CHAEBOL	-0.348 (-6.14)	-0.364 (-6.39)	-0.336 (-6.88)
LNSIZE	-0.196 (-14.72)	-0.174 (-12.76)	-0.140 (-6.16)
MB	0.053 (5.33)	0.033 (3.31)	0.463 (4.29)
CF	0.850 (4.90)	0.864 (5.02)	1.261 (3.44)
NWC	0.256 (3.55)	0.353 (4.79)	-0.065 (-0.20)
LEV	-0.537 (-12.39)	-0.470 (-10.80)	-1.492 (-6.84)
CAPEXP	0.111 (0.82)	0.048 (0.36)	0.199 (0.79)
R&D	9.403 (3.19)	8.420 (2.88)	2.013 (0.73)
DIV	0.691 (17.54)	0.718 (18.31)	0.393 (2.98)
Year dummy	yes	yes	
Industry dummy	no	yes	
No. Obs.	6592	6592	
Adj R-sq.	0.1998	0.2188	

Table 4 (Continued).

Panel B: Post-crisis period dummy for chaebol firms

	Regression I	Regression II
CHAEBOL	-0.401 (-5.68)	-0.420 (-5.95)
CHAEBOL x Post	0.128 (1.25)	0.135 (1.33)
LNSIZE	-0.198 (-14.78)	-0.176 (-12.83)
MB	0.053 (5.34)	0.033 (3.32)
CF	0.848 (4.89)	0.861 (5.00)
NWC	0.256 (3.56)	0.354 (4.80)
LEV	-0.536 (-12.38)	-0.469 (-10.78)
CAPEXP	0.121 (0.88)	0.058 (0.43)
R&D	9.487 (3.22)	8.507 (2.91)
DIV	0.692 (17.56)	0.718 (18.34)
Year dummy	yes	yes
Industry dummy	no	yes
No. Obs.	6592	6592
Adj R-sq.	0.1999	0.2188

Table 5. Estimation of non-bond interest expenses to bank loan ratio regressions

Dependent variable is a logarithm of non-bond interest expenses (#6110) divided by average bank loan where average. CHAEBOL is a dummy which takes the value of one if a firm belongs to chaebol, and zero otherwise. CHAEBOL x Post is an interaction term which takes the value of one if a firm belongs to chaebol in the post-crisis period, and zero otherwise. LEV is long-term plus short-term debt divided by total assets. OI is operating income divided by net asset. LNSALE is a logarithm of sales. INDUM is a dummy for 2 digit of standard industry code of Korea. Regression I is a cross-sectional time-series regression and includes year dummies. Regression II is a cross-sectional time-series regression and includes year and industry dummies. Regression III is an average of time-series coefficients of Fama-MacBeth cross-sectional regressions. t-stats of Regression III are from time-series coefficients of regressions. t-stats are in parentheses.

$$LNINTLOAN_{it} = \beta_0 + \beta_1 CHAEBOL_{it} + \beta_2 LEV_{it} + \beta_3 OI_{it} + \beta_4 LNSALE_{it} + Year_t + Ind_t + \varepsilon_t \quad (3)$$

Panel A: Full sample (1991-2000)

	Regression I	Regression II	Regression III
CHAEBOL	0.005 (0.17)	-0.007 (-0.22)	0.025 (0.45)
LEV	0.112 (5.81)	0.116 (6.01)	0.188 (2.30)
OI	-0.005 (-0.06)	-0.006 (-0.07)	0.628 (1.91)
LNSALE	0.066 (9.58)	0.075 (10.43)	0.039 (1.58)
Year dummy	yes	yes	
Industry dummy	no	yes	
No. Obs.	6796	6796	
Adj R-sq.	0.0903	0.105	

Panel B: Post-crisis period dummy for chaebol firms

	Regression I	Regression II
CHAEBOL	-0.145 (-3.80)	-0.159 (-4.16)
CHAEBOL x post	0.347 (6.45)	0.354 (6.63)
LEV	0.111 (5.78)	0.115 (5.99)
OI	-0.004 (-0.04)	-0.004 (-0.04)
LNSALE	0.063 (9.09)	0.071 (9.91)
Year dummy	yes	yes
Industry dummy	no	yes
No. Obs.	6796	6796
Adj R-sq.	0.0957	0.1106

Table 6. Estimation of cash to net assets ratio regressions on bond dummy

Dependent variable is a logarithm of cash divided by net assets. BONDDUM is a dummy that takes one if a firm has positive amount of bond, and zero otherwise. CHAEBOL is a dummy which takes the value of one if a firm belongs to chaebol, and zero otherwise. CHAEBOL x Post is an interaction term which takes the value of one if a firm belongs to chaebol in the post-crisis period, and zero otherwise. LNSIZE is logarithm of total asset. MB is the sum of book value of assets and market value of equity minus book value of equity divided by total assets. CF is operating income plus depreciation divided by net asset. NWC is current assets minus current liability minus cash divided by net asset. LEV is long-term plus short-term debt divided by total assets. CAPEXP is changes in fixed asset plus depreciation divided by net asset. R&D is research and development cost divided by net assets. When R&D is missing, it is set to zero. DIV is a dummy that takes one if dividends are paid out, and zero otherwise. INDUM is a dummy for 2 digit of standard industry code of Korea. Regression I is a cross-sectional time-series regression and includes year dummies. Regression II is a cross-sectional time-series regression and includes year and industry dummies. Regression III is an average of time-series coefficients of Fama-MacBeth cross-sectional regressions. t-stats of Regression III are from time-series coefficients of regressions. The pre-crisis subperiod is between 1991 and 1996, and the post-crisis subperiod is between 1997 and 2000. t-stats are in parentheses.

$$LNCASHASSET_{it} = \beta_0 + \beta_1 BONDDUM_{it} + \beta_2 CHAEBOL_{it} + \beta_3 LNSIZE_{it} + \beta_4 MB_{it} + \beta_5 CF_{it} + \beta_6 NWC_{it} + \beta_7 LEV_{it} + \beta_8 CAPEXP_{it} + \beta_9 R\&D_{it} + \beta_{10} DIV_{it} + Year_t + Ind_t + \varepsilon_t \quad (5)$$

Panel A: Full sample (1991-2000)

	Regression I	Regression II	Regression III
BONDDUM	-0.265 (-6.70)	-0.282 (-7.26)	-0.170 (-4.81)
CHAEBOL	-0.292 (-5.04)	-0.367 (-6.33)	-0.260 (-4.60)
LNSIZE	-0.104 (-7.04)	-0.080 (-5.31)	-0.063 (-2.74)
MB	0.079 (7.71)	0.049 (4.76)	0.516 (4.00)
CF	1.402 (8.00)	1.496 (8.67)	1.678 (5.99)
NWC	0.417 (5.69)	0.444 (5.95)	-0.001 (-0.00)
LEV	-0.484 (-10.86)	-0.424 (-9.53)	-1.612 (-6.00)
CAPEXP	0.315 (2.26)	0.199 (1.45)	0.196 (0.73)
R&D	13.626 (4.68)	12.709 (4.43)	6.191 (1.88)
DIV	0.599 (14.88)	0.640 (16.15)	0.325 (3.36)
Year dummy	yes	yes	
Industry dummy	no	yes	
No. Obs.	6745	6745	
Adj R-sq.	0.1971	0.2288	

Table 6 (Continued).

Panel B: Post-crisis period dummy for chaebol firms

	Regression I	Regression II
BONDDUM	-0.267 (-6.76)	-0.285 (-7.32)
CHAEBOL	-0.356 (-4.89)	-0.427 (-5.93)
CHAEBOL x Post	0.152 (1.45)	0.145 (1.41)
LNSIZE	-0.105 (-7.12)	-0.081 (-5.38)
MB	0.079 (7.73)	0.049 (4.77)
CF	1.399 (7.98)	1.493 (8.65)
NWC	0.418 (5.70)	0.445 (5.97)
LEV	-0.483 (-10.84)	-0.423 (-9.51)
CAPEXP	0.326 (2.34)	0.209 (1.52)
R&D	13.725 (4.71)	12.801 (4.46)
DIV	0.599 (14.90)	0.641 (16.16)
Year dummy	yes	yes
Industry dummy	no	yes
No. Obs.	6745	6745
Adj R-sq.	0.1971	0.2289

Panel C: Pre-crisis sub-period

	Regression I	Regression II	Regression III
BONDDUM	-0.171 (-3.83)	-0.199 (-4.44)	-0.143 (-2.60)
CHAEBOL	-0.315 (-5.47)	-0.361 (-6.17)	-0.279 (-3.11)
LNSIZE	-0.102 (-6.02)	-0.086 (-4.88)	-0.085 (-2.50)
MB	0.522 (8.86)	0.531 (8.84)	0.502 (3.39)
CF	-0.317 (-1.31)	-0.263 (-1.08)	1.623 (3.36)
NWC	-0.223 (-2.43)	-0.209 (-2.18)	-0.449 (-1.30)
LEV	-1.453 (-15.11)	-1.484 (-14.89)	-1.868 (-10.32)
CAPEXP	0.048 (0.22)	0.149 (0.69)	0.078 (0.24)
R&D	9.316 (1.56)	9.886 (1.64)	3.973 (0.80)
DIV	0.385 (7.57)	0.389 (7.68)	0.171 (1.48)
Year dummy	yes	yes	
Industry dummy	no	yes	
No. Obs.	3168	3168	
Adj R-sq.	0.2117	0.2247	

Table 6 (Continued).
Panel D: Post-crisis sub-period

	Regression I	Regression II	Regression III
BONDDUM	-0.243 (-3.87)	-0.261 (-4.24)	-0.210 (-7.08)
CHAEBOL	-0.260 (-2.54)	-0.354 (-3.49)	-0.231 (-4.01)
LNSIZE	-0.077 (-3.34)	-0.052 (-2.22)	-0.029 (-1.46)
MB	0.071 (5.95)	0.039 (3.29)	0.538 (2.04)
CF	1.999 (7.98)	2.089 (8.53)	1.761 (54.40)
NWC	0.788 (7.32)	0.784 (7.25)	0.672 (1.18)
LEV	-0.307 (-5.31)	-0.246 (-4.33)	-1.229 (-2.00)
CAPEXP	0.304 (1.63)	0.158 (0.87)	0.373 (0.73)
R&D	13.907 (3.80)	13.541 (3.79)	9.517 (2.69)
DIV	0.698 (11.91)	0.755 (13.08)	0.555 (6.53)
Year dummy	yes	yes	
Industry dummy	no	yes	
No. Obs.	3577	3577	
Adj R-sq.	0.2016	0.2435	